Carbon Rule and NAAQS Ozone Standard Revision Impacts on the Chesapeake TMDL

Bay Senior Manager's Conference Call

July 17, 2014

Lewis Linker and the CBP Modeling Team

Overview:

- New Ozone Standard
  - Where we are now with Allocation Air Scenario.
  - What the new ozone standard may be.
  - Additional load reductions beyond the current Allocation Air loads expected from changes in the ozone standard.
- Proposed Carbon Rule
  - Uncertainty is high with little guidance from CMAQ available in the early stages of the proposed rule.
  - An analysis jointly conducted by Syracuse and Harvard universities provides an initial preliminary, first cut estimate of TN reduction in the Chesapeake due to the proposed rule.

Bottom-line: The EPA will likely fully achieve air allocations and could have a margin of about a million pounds TN or more over and above the air allocation by 2025 (under current CMAQ scenarios). But, margins under future CMAQ scenarios have yet to be determined.

Overview *(continued)*:

- New CMAQ Scenarios
  - New CMAQ Bidirectional Ammonia Chemistry scenarios underway
  - Scenarios of 2002, 2011, 2018, and 2025 are planned.
  - The Tier 3 Fuel Rule, CAFE standards, Consent Decrees and all current regulations will be applied to the 2018 and 2025 scenarios
- Air Fact Sheet
  - Who, what, and when. Deadlines make it real!

New Ozone Standard:

Where we are now with the current Allocation Air Scenario:

The Chesapeake Bay 2010 Bay TMDL is based on estimated reductions in atmospheric deposition to the watershed and tidal Bay based on the **CMAQ 2020 Scenario**. This scenario provided EPA's best estimate of air loads in 2020 based upon the ozone standard in place in 2007, which was 0.080 ppm. The **CMAQ 2020 Scenario** is the basis for EPA's explicit allocation of 15.7 million pounds of nitrogen deposited directly to the tidal Bay.

The current ozone standard, established in 2008, is 0.075 ppm, but this ozone standard has yet to be run in a CMAQ scenario for the CBP because long running court challenges, first to CAIR and then to CSAPR, raised enough uncertainty in the what the ozone standard would be.

But, a key scenario supporting the Chesapeake TMDL, the Maximum Feasible Scenario, explored nitrogen deposition to the Chesapeake under an ozone standard set to 0.070 ppm. This scenario can be used for insight into what additional reductions could be expected for a reduced ozone standard.

New Ozone Standard:

What the new ozone standard could be:

GREENWIRE June 20, 2014

"U.S. EPA science advisers have officially endorsed a tighter ozone standard in the range of 60 to 70 parts per billion. In a letter to EPA yesterday, the Clean Air Scientific Advisory Committee said the current standard of 75 ppb was too high to protect people from asthma and other health problems. The committee said it based its recommendation on scientific evidence from clinical, epidemiological and animal toxicology studies. "There is adequate scientific evidence to recommend a range of levels for a revised primary ozone standard from 70 ppb to 60 ppb," CASAC wrote…. EPA is under a court deadline to propose a new ozone standard by Dec. 1 of this year and to finalize it by October 2015."

New Ozone Standard:

Additional load reductions beyond the current Allocation Air loads expected from changes in the ozone standard.

An estimate of the reduction in TN loads delivered to the tidal Bay with a 0.070 ppm ozone standard can be made by comparing the loads delivered to the Bay from the watershed under the 2020 Allocation Air Scenario (0.080 ppm ozone standard simulated) and the Maximum Feasible Scenario (0.070 ppm ozone standard simulated). The difference is estimated to be 0.9 million pounds of delivered nitrogen to the tidal Bay from the watershed (Linker et al., 2013. JARWA, Table 2).

For the tidal Bay the estimated reduction in nitrogen deposition from a 0.070 ppm ozone standard compared to the current Allocation Air is 0.4 million pounds (Linker et al., 2013. JARWA, Table 3).

Combined (watershed + direct deposition to tidal water), the total reduced atmospheric deposition load to the Bay with a 0.070 ppm ozone standard is about 1.3 million pounds. (If the ozone standard was set at the bottom end of the recommended range at 0.060 ppm a rough approximation of the additional benefit would be about 2.6 million pounds in reduced nitrogen delivered to the Bay.)

Proposed Carbon Rule:

Background:

- On June 2, 2014 the EPA proposed a plan to cut carbon pollution from power plants by 30 percent from 2005 levels by 2030.

- The proposed plan relies on states' devising individual approaches to meeting goals based on plans that best fit regional economies and mixes of energy sources.

- States can choose among a range of actions including shuttering coal plants, installing wind and/or solar power, installing energy-efficiency technologies, joining the California or Northeastern carbon cap-and-trade programs, or other actions.

The Syracuse-Harvard Analyses:

- On May 27, about a week before EPA's announcement of the proposed carbon rule, Syracuse University and Harvard University released a prospective analysis based on potential approaches the proposed rule could take. http://eng-cs.syr.edu/wp-content/uploads/2014/05/Carbon-cobenefits-study-FINAL-SPE.pdf

- The study used 2020 estimates of emissions as a Reference Case and three alternative 2020 policy scenarios. Each policy scenario reflected different carbon standards designs with varying stringency and flexibility. Because the analysis was conducted prior to the introduction of the EPA rule, none of the three scenarios exactly represent the proposed standard.

- The prospective scenario that most closely resembles EPA's proposed rule is Scenario #2, which reduced CO_2 from 2005 levels by 35.5% by 2020 (compared to the proposed EPA rule of 30% CO_2 reductions from 2005 levels by 2030). Scenario #2 also has high flexibility with compliance options, similar to the June 2 proposed CO_2 rule.

The Syracuse-Harvard Analyses:

- As a reference case, the Syracuse-Harvard analyses used a 2020 CMAQ air scenario similar to the Allocation Air 2020 Scenario used in the TMDL. Both had full CAIR implementation including Phase II 2015 rules.

- The general findings of the study were that policies intended to address climate change by reducing CO_2 emissions, also decreased emissions of SO_2 and NO_x.

- The study found that nitrogen deposition to the Chesapeake region decreased by about 1% under Scenario #2 (see Figure 11a and 11b in the study found here: http://eng-cs.syr.edu/wp-content/uploads/2014/05/Carbon-cobenefits-study-FINAL-SPE.pdf).

Key Questions for the Chesapeake TMDL:

- What does this new rulemaking mean for our WIPs and Bay TMDL going forward? Once promulgated, does it give us additional pounds of reduction than we have previously counted on in the air deposition component?

- The proposed CO2 regulations will positively influence the Chesapeake TMDL. The preliminary, first-cut estimate of decreased nitrogen loads to the tidal Bay from direct deposition is 0.16 million pounds. For the watershed, the 1% decrease in TN deposition is estimated to be a reduction of about 0.22 million pounds of nitrogen delivered to the Bay. (Based on 320 million pounds nitrogen deposition in 2020 and a 7% delivery factor of nitrogen deposition loads to the Bay.)

- The combined direct and indirect deposition estimated load reduction to the Chesapeake due to the proposed CO_2 regulations is about a 0.4 million pound reduction in delivered TN load to the Bay.

Key Questions for the Chesapeake TMDL:

- Uncertainty is high and the estimates will be improved going forward.

- Implementation of the proposed CO_2 regulation among the states is projected to be uneven, with some states already making considerable progress on CO_2 reductions since a 2005 baseline and others not. Full implementation for all is projected at 2030, and the changes in emissions over time will likely be picked up in future air modeling emission inventories.

- The CBP Airshed (CMAQ) Model will need to be run to more fully account for the influence of the proposed CO_2 regulation, but there currently are no plans for these runs.

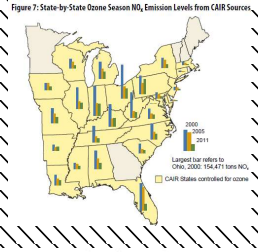
CMAQ Bidirectional Ammonia Chemistry Scenarios Underway:

- Scenarios of 2002, 2011, 2018, and 2025 are planned.
- The Tier 3 Fuel Rule, CAFE standards, consent decrees and all current regulations will be applied to the 2018 and 2025 scenarios.
- All planned scenarios will apply the current ozone standard of 0.075 ppm.
- The new bidirectional scenarios will be used for the 2017 Midpoint Assessment model development and for WIP III application.
- Presentation of the new CMAQ scenarios will be at the October 2014 Quarterly Review.

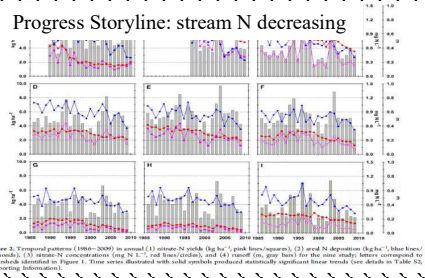
Air Fact Sheet (or White Paper)

- Who, what, and when. Deadlines will make this real:
  - Air Deposition – EPA has the lead on the atmo dep TMDL allocation
    - "How do we elevate its visibility in annual WIP assessment/milestone evaluation?
    - Can we start framing an atmospheric WIP report or fact sheet as an analog to a state report on their WIP and milestone progress?
    - How do we keep this on a high plane for communications? Bay Barometer? WIP Annual assessment report? Milestone Report? White Paper? Other recommendations?
    - Can we post a chart of the trajectory of air deposition reductions?"

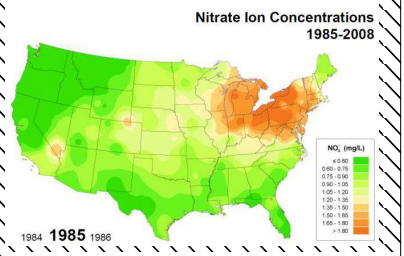
Progress Storyline: air emissions declining

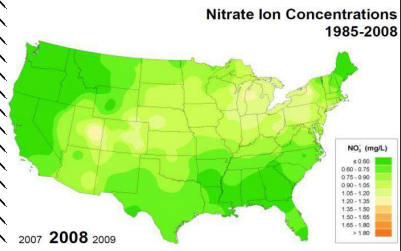


Progress Storyline: stream N decreasing



Progress Storyline: deposition decreasing





Progress Storyline: ozone violations decreasing